

SUPPORT FOR THE AMENDMENTS

Applicants have amended the Claims 1, 16, and 23 to delete matrices (c) and (d), i.e., to limit these claims to the matrices of Claims 5-8. Support for amended Claims 1, 16, and 23 can be found in the same claims, as previously presented. Applicants have also added new Claims 27-34. Support for new Claims 27-34 can be found in Claims 5-8, as originally filed.

No new matter has been added. Claims 1-8 and 13-34 are active in this application.

REMARKS/ARGUMENTS

Present Claims 1-8 and 13-15 relate to encapsulation compositions, which comprise:

(A) an encapsulate, encapsulated in:

(B) a glassy matrix,

wherein said glassy matrix is selected from the group consisting of:

(a) a composition, comprising:

(a<sub>1</sub>) 5 to 95 % by weight, based on the total weight of said composition (a), of a first n-octenylsuccinic anhydride-modified starch; and

(a<sub>2</sub>) 5 to 90 % by weight, based on the total weight of said composition (a), of a second n-octenylsuccinic anhydride-modified starch; and

(a<sub>3</sub>) 0 to 45 % by weight, based on the total weight of said composition (a), of a component selected from the group consisting of sugars, polyols, corn syrup solids, and mixtures thereof,

with the proviso that said first n-octenylsuccinic anhydride-modified starch is a dextrinized n-octenylsuccinic anhydride-modified starch and said second n-octenylsuccinic anhydride-modified starch is a hydrolyzed n-octenylsuccinic anhydride-modified starch; and

(b) a composition, comprising:

(b<sub>1</sub>) 5 to 95 % by weight, based on the total weight of said composition (b), of  
a first food polymer;

(b<sub>2</sub>) 5 to 90 % by weight, based on the total weight of said composition (b), of  
a second food polymer; and

(b<sub>3</sub>) 0 to 45 % by weight, based on the total weight of said composition (b), of  
a component selected from the group consisting of sugars, polyols, corn syrup solids,  
and mixtures thereof,

wherein said first food polymer is an n-octenylsuccinic anhydride-modified starch,  
and

wherein said second food polymer is selected from the group consisting of exudate  
gums, bacterial gums, extract gums, seed gums, pectins, dextrans, pregelatinized starches,  
agar agar, polydextrose, hydrogenated starch hydrolyzates, modified celluloses, seaweed  
hydrocolloid extracts, proteins, fractionated proteins, hydrolyzed proteins, and chitosan.

Present Claims 23-26 and 31-34 relate to processes for preparing such a composition,  
and Claim 15-22 and 27-30 relate to compositions prepared by such a process.

The present inventors have discovered that the presently claimed compositions are  
particularly effective for the encapsulation of materials. The cited references neither disclose  
nor suggest the presently claimed compositions or processes. Accordingly, these references  
cannot affect the patentability of the present claims.

The provisional rejection of Claims 1-4 and 9-26 under the judicially created doctrine  
of obviousness-type double patenting in view of Claims 1, 4-9, 11, 12, and 17-39 of co-  
pending application serial no. 10/864,631; the rejection of Claims 1-4 and 9-26 under the  
judicially created doctrine of obviousness-type double patenting in view of Claims 1-33 of  
U.S. Patent No. 6,652,895; the rejection of Claims 1-4 and 9-26 under the judicially created  
doctrine of obviousness-type double patenting in view of Claims 1-28 of U.S. Patent No.

6,790,453; the rejection of Claims 1-4 and 9-26 under 35 U.S.C. § 102(e) in view of U.S. Patent No. 6,652,895; the rejection of Claims 1-4 and 9-26 under 35 U.S.C. § 102(e) in view of U.S. Patent No. 6,416,799; the rejection of Claims 1-4 and 9-26 under the judicially created doctrine of obviousness-type double patenting in view of Claims 1-21 of U.S. Patent No. 6,416,799; the rejection of Claims 1-4 and 9-26 under 35 U.S.C. § 102(b) in view of U.S. Patent No. 6,187,351; the rejection of Claims 1-4 and 9-26 under 35 U.S.C. § 102(b) in view of U.S. Patent Nos. 5,897,897 or 5,603,971; and the rejection of Claims 1-4 and 9-26 under 35 U.S.C. § 102(b) in view of U.S. Patent Nos. 5,009,900 and 5,087,461 have all been obviated by appropriate amendment.

As the Examiner will note, Applicants have amended Claims 1, 16, and 23 to limit the glassy matrix to the embodiments of Claims 5-8. Accordingly, Applicants submit that amended Claims 1, 16, and 23, and the claims dependent thereon, are patentable over these references for the same reasons that Claims 5-8 were not rejected in view of these references.

Accordingly, the rejections should now be withdrawn.

The rejection of Claims 1-26 under 35 U.S.C. § 103(a) in view of U.S. Patent Nos. 5,897,897 (Porzio et al. '897) or 5,603,971 (Porzio et al. '971) is respectfully traversed. For clarity, the patentability of the "a" matrix (dependent Claims 5, 6, 27, 28, 31, and 32) and the "b" matrix (dependent Claims 7, 8, 29, 30, 33, and 34) will be addressed separately. Moreover, since Porzio et al. '897 and Porzio et al. '971 are related and have substantially the same disclosure, this rejection will be discussed in terms of Porzio et al. '971.

As noted above, the "a" matrix comprises a first n-octenylsuccinic anhydride-modified starch, which is a dextrinized n-octenylsuccinic anhydride-modified starch, and a second n-octenylsuccinic anhydride-modified starch, which is a hydrolyzed n-octenylsuccinic anhydride-modified starch.

In this regard, the only compositions of Porzio et al. '971 which contain any type of modified starch are embodiments (f) and (g):

(f) 30 to 100 wt. % of a modified starch (e.g. sodium octenyl succinate modified starch), and 0 to 70 wt. % of a mono- or disaccharide; or

(g) 85 to 100 wt. % of a modified starch (e.g. sodium octenyl succinate modified starch), and 0 to 15 wt. % of a polyhydric alcohol.

Porzio et al. '971, col. 4, lines 34-39.

Thus, there is no disclosure or suggestion in Porzio et al. '971 of any composition which contains two different modified starches. In contrast, as noted above, matrix "a" of the present claims comprises a first n-octenylsuccinic anhydride-modified starch, which is a dextrinized n-octenylsuccinic anhydride-modified starch, and a second n-octenylsuccinic anhydride-modified starch, which is a hydrolyzed n-octenylsuccinic anhydride-modified starch.

As explained in the previously-filed response, n-octenylsuccinic anhydride-modified starches ("OSAN-starches") are characterized under the 21CFR §172.890, and include both "dextrinized" and "hydrolyzed" materials. However, the "hydrolyzed" materials are in fact more like octenylsuccinic anhydride modified maltodextrins (see 21 CFR § 184.1444). The "dextrinized" OSAN-starches show "card-board" off-flavors. Thus, the hydrolyzed OSAN-starches are more desirable from organoleptic considerations. However, another key functionality is in their melting and plastic flow characteristics that the different starches segregate themselves into the functional and non-function categories, thus, providing functional processing and physical properties when combined, *i.e.* desirable melt-flow, good elastic recovery and blander organoleptic character.

For the Examiner's convenience, the physical differences of the various commercial OSAN-starches are summarized presented below.

I. Dextrinized OSAN-modified starch (Capsul E (corn based, National Starch), Capsul TA (tapioca based, National Starch), Miracap (corn based, Tate & Lyle)):

Process of production: The modified starch is prepared by dextrinization in a silo of a waxy maize or a tapioca starch under low pH, low moisture, and high heat conditions. Then the dextrinized starch is modified with octenyl succinic acid anhydride by addition of the octenyl succinic anhydride to a waxy maize or tapioca starch by adding the solid anhydride to the starch powder, mixing and then heating the mixture to elicit dextrinization in a bulk chamber. This process yields a simultaneous dextrinization and chemical modification of the starch

Structure: Many original native starch granules are present in the dispersion of the final modified starch

Typical pH in 5% solution: 2.9-3.1 (Capsul E) or 6.5 (Miracap)

Color: gray yellow to brown (Capsul E) or white to off-white (Miracap)

Sensory evaluation in solutions: Significant acidity, cardboard, astringent, burning aftertaste.

Viscosity, cp @ 80°F (Brookfield RVT): 100 cp @ 30% solids

Properties in the melt: low viscosity, low elastic recovery (1.0-1.1, no expansion), quickly setting into a glassy state.

Glass transition properties of the extruded and cooled melt @ 8% moisture: glass transition temperature 45-50°C, heat capacity change 0.2 J/g/°C.

II. Enzymatically hydrolyzed OSAN-modified starch (Emap12634 (Cargill), Hi-Cap100 (National Starch))

Process of production: The starch is prepared by enzymatic hydrolysis of a waxy maize starch at slightly elevated temperature and chemical modification with octenyl succinic acid anhydride.

Structure: No original native starch granules are present in dispersion.

Typical pH in 5% solution: 5.0-5.5

Color: white

Sensory evaluation in solutions: clean starch, no significant off-notes

Viscosity, cp @ 80°F (Brookfield RVT): 359 cp @ 30% solids

Properties in the melt: low viscosity, high elastic recovery (1.3-1.6), slowly setting into a glassy state

Glass transition properties of the extruded and cooled melt @ 8% moisture: glass transition temperature 35-42°C, heat capacity change 0.1 J/g/°C.

### III. Acid hydrolyzed OSAN-modified starch (Emcap12639 (Cargill)):

Process of production: The starch is prepared by acid hydrolysis of a waxy maize starch and followed by chemical modification with octenyl succinic acid anhydride.

Structure: No original native starch granules are present in dispersion.

Typical pH in 5% solution: 5.5

Color: white

Sensory evaluation in solutions: clean starch, bland, no significant off-notes

Viscosity, cp @ 80°F (Brookfield RVT): 600 cp @ 30% solids

Properties in the melt: high viscosity, high elastic recovery (1.3-1.6), slowly setting into a glassy state

Glass transition properties of the extruded and cooled melt @ 8% moisture: glass transition temperature 35-42°C, heat capacity change 0.1 J/g/°C.

In the case of Porzio et al. '971, the only disclosed modified starches are :

A preferred modified starch is sold under the trade name of CAPSUL<sup>®</sup> (National Starch Co.) which is characterized as a sodium octenyl succinate modified starch. Similar functional ingredients are available from American Maize Company as the Amiogum 23 product.

Porzio et al. '971, col. 14, lines 18-21.

The CAPSUL<sup>®</sup> and the Amiogum 23 of Porzio et al. '971 both belong to the dextrinized OSAN-modified starches described above. Thus, Porzio et al. '971 contains no disclosure of any compositions which contain hydrolyzed n-octenylsuccinic anhydride-modified starch.

Moreover, contrary to the position taken in the Official Action, there is nothing in Porzio et al. '971 which would suggest combining a dextrinized n-octenylsuccinic anhydride-modified starch with a hydrolyzed n-octenylsuccinic anhydride-modified starch. As explained above, a hydrolyzed n-octenylsuccinic anhydride-modified starch is very different from a dextrinized n-octenylsuccinic anhydride-modified starch. While a dextrinized n-octenylsuccinic anhydride-modified starch contains native starch granules, a hydrolyzed n-octenylsuccinic anhydride-modified starch does not. In addition, solutions of these compounds have very different viscosities.

For these reasons, the disclosure of compositions which contain a dextrinized n-octenylsuccinic anhydride-modified starch in Porzio et al. '971 would not have motivated one of skill in the art to replace a portion of the dextrinized n-octenylsuccinic anhydride-modified starch with a hydrolyzed n-octenylsuccinic anhydride-modified starch.

For these reasons, the rejection of the "a" matrix should be withdrawn.

As explained above, the "b" matrix comprises a first food polymer, which is an n-octenylsuccinic anhydride-modified starch, and a second food polymer, which is selected from the group consisting of exudate gums, bacterial gums, extract gums, seed gums, pectins,

dextrins, pregelatinized starches, agar agar, polydextrose, hydrogenated starch hydrolyzates, modified celluloses, seaweed hydrocolloid extracts, proteins, fractionated proteins, hydrolyzed proteins, and chitosan. Thus, the "b" matrix contains a mixture of an n-octenylsuccinic anhydride-modified starch and a food polymer which has a high molecular weight.

In contrast, Porzio et al. '971 only discloses the use of modified starch in combination with low-molecular weight compounds, such as mono- or disaccharides and polyhydric alcohols (see, Porzio et al. '971, col. 4, lines 34-39). Nowhere in Porzio et al. '971 is there any disclosure which would suggest a combination of an n-octenylsuccinic anhydride-modified starch with a high-molecular weight second food polymer.

For these reasons, the rejection of the "b" matrix should be withdrawn.

Accordingly, the rejection should be withdrawn.

Applicants submit that the present application is now in condition for allowance, and early notification of such action is earnestly solicited.

Respectfully submitted,

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